CLAIMS

What is claimed is:

1. An isolated nucleic acid fragment encoding a plant *cis*-prenyltransferase protein selected from the group consisting of:

(a) an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18 and SEQ ID NO:20;

(b) an isolated nucleic acid fragment that is substantially similar to an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18 and SEQ ID NO:20;

(c) an isolated nucleic acid fragment encoding a polypeptide, the polypeptide having at least 41% identity with the amino acid sequence set forth in SEQ ID NO:24;

(d) an isolated nucleic acid fragment encoding having at least 50% identity with nucleic acid sequence as set forth in SEQ ID NO:23;

(e) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence of (a) (b), (c) or (d) under the following hybridization conditions: 0.1X SSC, 0.1% SDS, 65°C and washed with 0.2X SSC, 0.5% SDS;

(f) an isolated nucleic acid fragment that hybridizes with a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17 and SEQ ID NO:19 under the following hybridization conditions: 0.1X SSC, 0.1% SDS, 65°C and washed with 0.2X SSC, 0.5% SDS ; and

(g) an isolated nucleic acid fragment that is complementary to (a), (b), (c), (d), (e) or (f).

2. The isolated nucleic acid fragment of Claim 1 selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17 and SEQ ID NO:19.

3. A polypeptide encoded by the isolated nucleic acid fragment of Claim 1.

4. The polypeptide of Claim 3 selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18 and SEQ ID NO:20.

5. A chimeric gene comprising the isolated nucleic acid fragments of Claim 1 operably linked to suitable regulatory sequences.

6. A transformed host cell comprising a host cell and the chimeric gene of Claim 5.

7. The transformed host cell of Claim 6 wherein the host cell is selected from the group consisting of plant cells and microbial cells.

8. A host cell according to Claim 7 selected from the group consisting of tobacco (*Nicotiana* spp.), tomato (*Lycopersicon* spp.), potato (*Solanum* spp.), hemp (*Cannabis* spp.), sunflower (*Helianthus* spp.), sorghum (*Sorghum vulgare*), wheat (*Triticum* spp.), maize (*Zea mays*), rice (*Oryza sativa*), rye (*Secale cereale*), oats (*Avena* spp.), barley (*Hordeum vulgare*), rapeseed (*Brassica* spp.), broad bean (*Vicia faba*), french bean (*Phaseolus vulgaris*), other bean species (*Vigna* spp.), lentil (*Lens culinaris*), soybean (*Glycine max*), arabidopsis (*Arabidopsis thaliana*), guayule (*Parthenium argentatum*), cotton (*Gossypium hirsutum*), petunia (*Petunia hybrida*), flax (*Linum usitatissimum*) and carrot (*Daucus carota sativa*).

9. The transformed host cell of Claim 7 wherein the host cell is selected from the group consisting of *Aspergillus*, *Saccharomyces*, *Pichia*, *Candida*, *Hansenula*, *Bacillus*, *Escherichia*, *Salmonella* and *Shigella*

10. A method of altering the level of expression of a plant *cis*-prenyltransferase protein in a host cell comprising:

(a) transforming a host cell with the chimeric gene of Claim 6 and;

(b) growing the transformed host cell produced in step (a) under conditions that are suitable for expression of the chimeric gene resulting in production of altered levels of a plant *cis*-prenyltransferase protein in the transformed host cell relative to expression levels of an untransformed host cell.

11. A method according to Claim 10 wherein the host cell is a plant cell selected from the group consisting of tobacco (*Nicotiana* spp.), tomato (*Lycopersicon* spp.), potato (*Solanum* spp.), hemp (*Cannabis* spp.), sunflower (*Helianthus* spp.), sorghum (*Sorghum vulgare*), wheat (*Triticum* spp.), maize (*Zea mays*), rice (*Oryza sativa*), rye (*Secale cereale*), oats (*Avena* spp.), barley (*Hordeum vulgare*), rapeseed (*Brassica* spp.), broad bean (*Vicia faba*), french bean (*Phaseolus vulgaris*), other bean species (*Vigna* spp.), lentil (*Lens culinaris*), soybean (*Glycine max*), arabidopsis (*Arabidopsis thaliana*), guayule (*Parthenium argentatum*), cotton (*Gossypium hirsutum*), petunia (*Petunia hybrida*), flax (*Linum usitatissimum*) and carrot (*Daucus carota sativa*).

12. A method according to Claim 11 wherein the altering the level of expression of a plant *cis*-prenyltransferase protein results in a modulation in the defense mechanism of the plant.

13. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a plant *cis*-prenyltransferase protein comprising:

(a) probing a cDNA or genomic library with the nucleic acid fragments of Claim 1;

(b) identifying a DNA clone that hybridizes with the nucleic acid fragments of Claim 1; and

(c) sequencing the cDNA or genomic fragment that comprises the clone identified in step (b),wherein the sequenced cDNA or genomic fragment encodes a plant *cis*-prenyltransferase protein.

14. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a plant *cis*-prenyltransferase protein comprising:

(a) synthesizing at least one oligonucleotide primer corresponding to a portion of the sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17 and SEQ ID NO:19;

(b) amplifying a cDNA insert present in a cloning vector using the oligonucleotide primer of step (a); wherein the amplified cDNA insert encodes a plant *cis*-prenyltransferase protein.

15. The product of the method of Claims 13 or 14.